small beetle's larva. Of the latter, only the chitinised head and portion of the epidermis remained. The wasp larva was rather elongated (8.5 x 1.7 mm.), but otherwise of typical Ichneumonoid form. By reason of its proximity to the Megalyrid's observed egg-laying activities it was reasonable to assume a direct relationship and subsequent development of the larva has demonstrated the correctness of this conjecture.

On the 28th December (i.e., five days after removal from the wood) metamorphosis occurred. The pupal form was such as to leave no doubts of its identity as a Megalyrid, but the absence of ovipositor indicated that this specimen was a male. This was rather disappointing, as I would have welcomed the opportunity of observing the manner of disposition of the long appendage during the pupal state.

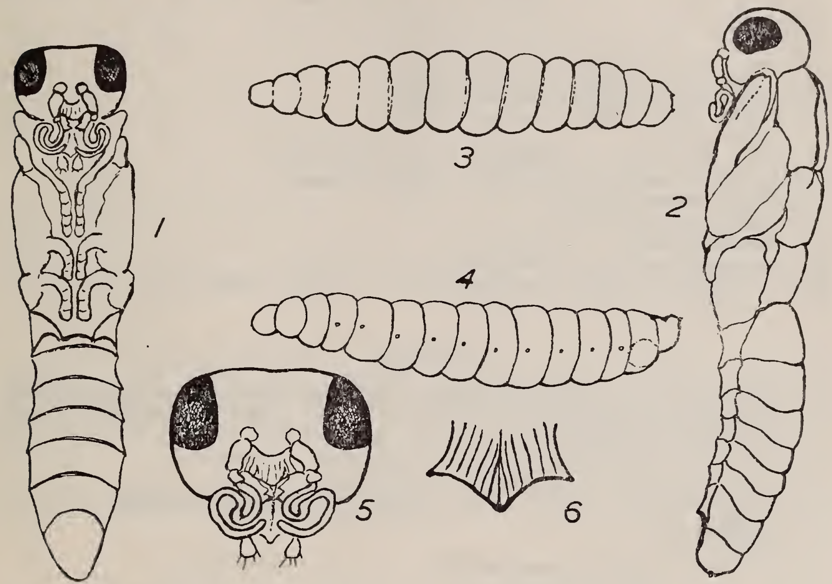

Fig. 4: Biology of Megalyridae.

1. Pupa of male—ventral view.
2. Lateral view.
3. Last instar larva—dorsal view.
5. Head of pupa enlarged to show coiled arrangement of antennae.
6. Pupal clypeus (greatly magnified).

Pigmentation of the compound eyes commenced within three days of pupal ecdysis and proceeded rapidly thereafter. By the 23rd January pigmentation was practically complete, and a week later the legs were fully developed and capable of vigorous movement. Unfortunately, the conditions could not have been suitable to permit complete shedding of exceedingly thin and closely adhering pupal "skin" and this, in turn, prevented final development of the wings.

A peculiar feature of the pupal morphology was the manner in which the developing antennae were compactly looped in the form of the two flat coils. (See text-fig. 4.)

Since completing these notes my attention has been drawn to a short paper by Gray (1947) in which are recorded some observations on Megalyrid egg-laying.

The method of ovipositor manipulation appears to have been similar to that observed by the writer, but it is difficult to interpret satisfactorily Gray's claim that the tube is inserted into "minute holes" in the timber's surface. However, as the holes were in fence posts, it is possible that the wasps were actually ovipositing in galleries which had been exposed during dressing of the original logs.

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EXPLANATION OF PLATES.

PLATE xl.

1. Ventral view of Stephanid pupa—male.
2. Lateral view of Stephanid pupa—female.
3. Ventral view of fully developed larva.
4. Lateral view.
5. Scape and portion of flagellum of adult Stephanid.
6. Tip of ovipositor showing slightly barbed surface.
7. Tip of ovipositor sheath.
8. Labial palp of female.
9. Maxillary palp.
10. Anterior wing of adult Stephanid.
11. The hamuli are few in number and of very weak construction.
12. The tarsal claws are mono-denate.

PLATE xli.

1. Adult *Megalyra fasciipennis*—female. Only small portion of ovipositor shown.
2. Illustrating position adopted for insertion of ovipositor in frass plug. Commencement of operation.
3. The beautifully constructed rasp just behind the ovipositor tip.
4. Portion of anterior wing showing weak hamuli.
5. Basal segments of antenna. Note curved first segment of flagellum.
6. Maxillary palp.
7. Labial palp.
8. The tarsal claws are monodentate.

RECENT PALAEONTOLOGY.

By Tom Iredale.

Bather, in his Presidential Address to the Geological Section of the British Association for the Advancement of Science in 1920, discussed the relations of the palaeontologist and the neontologist, showing how each must supplement the other in the unravelling of evolutionary secrets. He was dealing with his own familiar Echinodermata, but drew examples from every other class, especially stressing the time-concept on classification as opposed to the neontologists' scheme of static forms. Unfortunately, as he well understood, the very imperfect geological record induced as much error in the time usage as the neontologist did in his static arrangements. Probably the skilled neontologist recognises the fallacies in his system, but has not received help from the palaeontologist, who has commonly regarded the neontologists' work as unintelligible and not applicable. However, Bather realised that the recent advances in neontologists' methods might tend to solve some of the palaeontologists' problems and that "an organism should be studied in relation to the whole of its environment".

Molluscs probably react more rapidly to environmental stresses than members of most other classes, and as their external skeletons are well preserved palaeontological subjects, they can be cited as worthy examples for intensive study. After discussing the many changes recognised by palaeontologists, Bather concluded, "To correlate the succession of living forms with all these changes is the task of the palaeontologist. To attempt it he will need the aid of every kind of biologist, every kind of geologist".

I have long maintained that the marine mollusca of the Tertiaries of Southern Australia are so closely bound up with the living species that their study must be carried out by the close co-operation of the palaeontologist with an experienced neontologist (conchologist). At present the palaeontologist rarely asks the assistance of the neontologist, although many of his troubles might be obviated by such reference.

Herewith are presented some examples that have come under my notice with indications of their manner of solution:—

Largs, near Newcastle, New South Wales.

From a series of raised beaches, a large number of mollusca was collected and reported upon some sixty years ago. The specimens were of recent facies, so were submitted to J. Brazier, the well-known conchologist, at that date. Thirty-two species were separated and named as follows:—*Ostrea angasi, O. subtrigona, Pecten strangei, P. asperrimus, P. tegula, Mytilus hirsutus, M. menkeanus* var., *Scapharca gubernaculum, Chama spinosa, Tellina deltoidalis, Corbula scaphoides, Spisula cretacea, Tapes turgida, Chione isabella, C. lamellata, Dosinia sculpta, Venus* (*Timoclea*) sp., *Clementia papyracea, Fusus hanleyi, Nassa livida, N. jonasi, Natica conica, N. plumbea,* Monilea *lentiginosa, Calliostoma decoratum, Euchelus atratus, Triton costata, T. pilearis, Risella lutea, Lampania australis, Potamides ebeninus, Trochocochlea multicarinata* (and *Balanus trigonus,* barnacle). To-day this collection shows mixture of shells from rocky foreshores, sandy shores and estuarine waters with muddy influence, almost exactly paralleling a collection from an estuarine water with outside overflow. The collection was reported as above in the Records of the Geological Survey of N.S.W., Vol. II., p. 48, 1890, and the specimens should be in the Survey's possession. This collection was duplicated by Hedley in 1916 and housed in the Australian Museum, Regd. Nos. C.40749 et seq., 32 species in all. The coincidence in the number of species is exact, but not exactly the same species were collected. Those added by Hedley were:—*Pecten medius, Salacia jacksoni, Venerupis crenata, Standella nicobarica, Codakia pisidium, Arcularia peritrema, Leucotina concinna, Mathilda* sp., *Turbonilla* sp. and *Dentalium* sp. There is nothing in these additions to alter the above conclusion. The

late H. S. Mort showed me a small collection that came into his possession labelled, "From Largs, near Maitland. At the depth of twelve feet from the surface occurs an ancient sea beach. From this bed these marine shells were taken". There were about eleven species obviously of the same series.

The species which attract attention are *Pecten strangei, Mytilus menkeanus* var. (Hedley called it M. *erosus*) and *Euchelus atratus.* The first named has since turned up in Sydney Harbour dredgings, while *Euchelus atratus* (a common tropical shell) has been found on the shores of northern New South Wales. But the other has defied relationship and is here named *Antetrichomya problematica* gen. et sp. nov. to keep the problem under review. It was recorded as *menkeanus* and then as *erosus,* both natives of southern Australian, but it seems to have no close relationship with them. It bears a much more deceptive resemblance to the Neozelanic *maorianus,* but has the inner edge crenulate throughout, thus widely separating it. In this feature it agrees with *Trichomya* and the hinge can be compared also with the hinge of that genus. The shell, however, is much larger, more strongly ribbed, stouter, the hinge having a large elongated narrow tooth, whereas *Trichomya* is edentulous. The shape is very like that of *T. hirsuta,* the ventral surface being sinuately incurved, the dorsal angle acute, but the posterior dorsal margin flattened: the sculpture consists of about twenty thickened ribs posteriorly diverging to over forty. The ventral area is similarly sculptured, but the ribs are very much thinner and almost obsolete medially, almost suggesting a smooth area. The size is very large, the largest (type) being broken posteriorly, yet measuring 90 mm., with a height of 50 mm. *Antetrichomya* is nothing much like *erosus* in shape, but has similar heavy sculpture, while it lacks the boss seen on the anterior muscle-scar, an easy recognition mark of *erosus.* The hinge, of course, differs.

All the specimens discussed in this paper are in the Australian Museum.

Bather suggested a time-concept genus; that is, the fossil representatives that could be arranged successionally should be considered a genus, and not the present series that appear similar, but may have a distinct lineage series. This is excellent in a Utopian collection which shows the lineage completely, but this occurs so rarely that as much guesswork would be needed in the formation of lineage series as there is in the present usage of similarity species. In mollusca these lineage series can be suggested by the study of recent forms, but only rarely can the facts be determined. Years ago I indicated that the relationship between the recent marine mollusca of Southern Australia and the fossils in the Victorian beds was extremely close, and that lineage series should be worked out. However, before this could be successfully performed much novel stratigraphical study must be undertaken and new collections in accordance with the stratigraphical results made, and then these should be critically examined by a neontologist before any results were published as to their affinities.

The form above described appears to be an indirect ancestor of the recent *Trichomya hirsuta* and both appear in the collections. This suggests that the collection is not pure; that is, from the same horizon, and that the fossil ancestor was found in a lower zone. *Trichomya hirsuta* occurs between tides from Southern Australia to North Queensland without any useful variation, congregating in large masses. Such associations suggest casualties, and in kitchen middens above the sea-level in Middle Harbour, Sydney, shells of this species abound, though at present no living specimens exist anywhere near the locality.

TOMAGO SANDBED BORINGS.

Mr. Ivor Callen, of the Hunter Water Board, submitted some samples from borings made in this district, north of Newcastle, New South Wales. Many species of shells were picked out of the different borings with stated depths, and the results were so interesting that confirmation was desired, but the boring was too expensive to be carried out for the mere satisfaction of the scientist. It seems best to put these on record, as the chance of confirmation is now more remote.

The shallowest boring submitted was some thirty feet down, and all the shells were common estuarine forms with no puzzling species at all present. This was what would have been expected, but a few feet below the majority of the species